NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Ames Research Center ARC1-01-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Computer Science	LUNAR UTILITY ROBOTICS: The focus of this project is to develop utility robots and procedures to automate lunar operations. Utility robots will perform: (1) tedious, highly repetitive, long-duration tasks that can be off-loaded from astronauts and (2) rapid response for addressing time-critical situations. Example tasks include: systematic site surveys, mobile camera platform, inspection, emergency response, site preparation, instrument deployment. This project involves software development in C++ under Linux and Java / Eclipse.
Ames Research Center ARC1-02-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Electrical, Electronic, Computer Engineering, Computer Science	3D COMPUTER VISION: Since 1998, the NASA Ames Intelligent Robotics Group (IRG) has been developing stereo vision software to automatically build high-quality 3D terrain models from orbital images in a matter of hours (with minimal or no human intervention). The goal of this project is to adapt this software for use with the Mars Reconnaissance Orbiter, historic Apollo camera images, and cameras planned for the Lunar Reconnaissance Orbiter. This project involves software development in C++, focused on applied computer vision and 3D modeling.
Ames Research Center ARC1-03-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Electrical, Electronic, Computer Engineering, Computer Science	REAL-TIME STEREO VISION FOR ROBOT NAVIGATION: The goal of this project is to take advantage of hardware-based stereo vision (GPU and FPGA acceleration) to enable very fast obstacle avoidance, navigation, and terrain modeling for mobile robots. This project involves computer vision theory, cross-platform software development (Linux and C++), and mobile robot testing.
Ames Research Center ARC1-04-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Electrical, Electronic, Computer Engineering, Computer Science	ROBOT SYSTEM SOFTWARE: The NASA Ames Intelligent Robotics Group (IRG) operates mobile robots using a rich library of robot software. IRG is currently developing a new "service oriented" architecture to make it easier to integrate new hardware devices and algorithms. This project involves developing new robot software systems and requires strong knowledge/experience in C/C++ and distributed systems.

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Ames Research Center ARC1-05-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Electrical, Electronic, Computer Engineering, Computer Science	GIGAPAN: GigaPan is a robotic camera mount (http://gigapan.org) that enables capturing multi-gigapixel, explorable panoramas with most off-the-shelf digital cameras. These panoramas have many uses: scientific exploration (especially geology), inspection (structures, vehicles, etc.), site recon/characterization. This project will improve GigaPan in one (or more) of the following areas: user interface, cross-platform software, image mosaicking, and High-Dynamic Range imaging.
Ames Research Center ARC1-08-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Computer Science	ROBOTIC AND ASTRONAUT ACTIVITY PLANNING PROJECT: This work will focus on supporing the planning of activities for the Mars Science Laboratory 2009 rover mission as well as the NASA Extreme Enviornments Mission Operations (NEEMO) underwared astronaut training lab. This project will provide applied experience working as part of a Human-Computer Interaction team at NASA. The work will include data collection and analysis for current NASA missions. Skills required to support this work include computer science.
Ames Research Center ARC1-10-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Computer Science, Other Other: Psychology, Physiology	MODELING HUMAN PERFORMANCE PHYSIOLOGY: Overall Research Goal: To develop and validate countermeasures to mitigate risks to neurobehavioral functions and enhance health, performance and safety of crews during extended duration spaceflight. To develop a real-time physiological model that will predict or classify individual and team performance. Test applications for biofeedback, neurofeedback, and other self-regulation measures. Skills: (preferred) 1. Some programming experience with Visual Basic, C/C++, Matlab. 2. Some familiarity with digital signal processing techniques, in particular human biomedical data (e.g., ECG, EEG). 3. Some experience with neural network based models 4. Psychophysiology

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Ames Research Center ARC1-11-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Computer Science, Other Other: Psychology, Physiology	MONITORING AND CORRECTING HAZARDOUS OPERATION STATES: Overall Research Goal: To develop and validate countermeasures to mitigate risks to neurobehavioral functions and enhance health, performance and safety of crews during extended duration spaceflight. Objectives: 1. To study how humans adapt in space analog environments (e.g., isolation, confinement, and sustained operations), and to identify individual characteristics that best predict team performance; 2. To compare the effectiveness of selected countermeasures for mitigating performance impairments of individuals exposed to high-stress, high workload situations; 3. To develop non-intrusive, portable methods for self-detection and correction of adverse changes in physiological states, mood states, and cognitive, perceptual, and neuromotor function; 4. To develop a real-time physiological model that will predict or classify individual and team performance. Skills: (preferred) 1. Some familiarity with digital signal processing techniques, in particular human biomedical data (e.g., ECG, EEG). 2. MS Office, including Excel 3. Psychology, physiology
Ames Research Center ARC2-06-09-AN	Spring, Summer, Fall	Ground Operations	Electrical, Electronic, Computer Engineering, Computer Science	3D MULTI-ROBOT USER INTERFACE: "Viz" is an interactive 3D user interface developed by the NASA Ames Intelligent Robotics Group (IRG). It allows mission operations teams to remotely control mobile robots and to study the data collected by the robots. This project will focus on improving Viz: adding command sequencing tools for multiple robots, incorporating speech and dialogue, adding predictive graphics (for time-delayed teleoperation). This project involves software development of multi-threaded Java applications, user interface design, and an understanding of 3D graphics.
Ames Research Center ARC2-07-09-AN	Spring, Summer, Fall	Ground Operations	Electrical, Electronic, Computer Engineering, Computer Science	GROUND CONTROL SOFTWARE FOR LUNAR SURFACE OPERATION: The NASA Ames Intelligent Robotics Group (IRG) is developing a prototype ground control system to support lunar surface operations (e.g., science exploration) involving humans and robots. The goal of this project is to develop software systems including 2D/3D user interfaces, ground data servers, and group collaboration tools. This project involves programming in C++, Java, and/or scripting languages (Python, PERL, etc.).

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Ames Research Center ARC2-09-09-AN	Spring, Summer, Fall	Ground Operations	Electrical, Electronic, Computer Engineering, Computer Science	RISK MANAGEMENT FOR NASA'S NEW MANNED SPACE PROJECT: Orion and Ares will replace Space Shuttle as the new space vehicle to get astronauts, not only into orbit and to the Space Station, but also to the surface of the Moon within the next few years. This project will provide applied experience working as part of a Human-Computer Interaction team on risk assessment and management for NASA. The work will include data collection and analysis for current NASA missions. Skills required to support this work include computer science.
Ames Research Center ARC4-12-09-AN	Spring, Summer, Fall	Spacecraft	Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	HAPTIC COMPUTER INTERFACES FOR SPACE APPLICATIONS: Engineering internship to work on programming, modeling, analysis, and calibration for computer controlled haptic interfaces.
Ames Research Center ARC4-13-09-AN	Spring, Summer, Fall	Spacecraft	Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	HUMAN PERFORMANCE DURING LAUNCH VIBRATION: Engineering internship to work on programming, modeling, analysis, and calibration for computer controlled seat vibration simulator.
Ames Research Center ARC5-14-09-AN	Spring, Summer, Fall	All	Computer Science	ADVANCED VISUALIZATION OF COMPUTATIONAL PHYSICS DATA: Advanced data analysis and visualization techniques for large-scale simulation data, hyper-dimensional data, real-time simulation data streams, and hyperwall environments. Example applications include computational fluid dynamics, structural dynamics, N-body systems, and computational chemistry. Skills required: computer graphics. Students will learn C++ and OpenGL programmin in real world development. Strong math background is very helpful.

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Ames Research Center ARC5-15-09-AN	Spring, Summer, Fall	All	Electrical, Electronic, Computer Engineering, Computer Science	PROGRAMMING PARADIGMS AND TOOLS FOR SUPERCOMPUTER APPLICATIONS: Supercomputer application development programming paradigms and tools that significantly reduce the effort and technical challenge of converting a mathematical model or serial application code into a correct and efficient supercomputer app code. Internship: Study one advanced app dev programming paradigm by implementing it in a known benchmark (such as one of the NAS Parallel Benchmarks), or conduct a user study/survey to identify useful functionalities for parallel programming tools SDC: Compare app dev programming paradigms or develop new functionalilty or implementation techniques for a programming paradigm or tool
Ames Research Center ARC5-16-09-AN	Spring, Summer, Fall	All	Electrical, Electronic, Computer Engineering, Computer Science	SUPERCOMPUTER SYSTEM BENCHMARKING: SPerformance Analysis, and Comparative Analysis. Characterize the performance of an application on two or more computer architectures and explain how architectural differences impact performance, or develop a website to store, access, and understand performance results; SDC: Compare benchmarking approaches or prototype new benchmarking functionalilty.
Ames Research Center ARC5-17-09-AN	Spring, Summer, Fall	All	Electrical, Electronic, Computer Engineering, Computer Science	USER SERVICES: Supercomputer user environments with more intuitive, intelligent, and integrated interface to support supercomuting resources, services, and simulation data. Interns are expect to perform established user environment task or study one advanced user environment approach.
Ames Research Center ARC5-18-09-AN	Spring, Summer, Fall	All	Electrical, Electronic, Computer Engineering, Computer Science	ADVANCED SUPERCOMPUTING ARCHITECTURE R&D: This project is to improve price-performance and/or programmability for NASA applications. Interns are expected to study one advanced architecture; and compare supercomputer architectures or prototype new architecture evaluation functionality.

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Ames Research Center ARC5-19-09-AN	Spring, Summer, Fall	All	Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	ENGINEERING FOR MANAGING THE INFRASTRUCTURE OF PHYSICAL PLANT: Design and develop engineering solutions for providing electrical and cooling resources for a large supcomputing facility, including significant changes to equipment, floorspace, electric power, and air/water cooling. Interns are expected to perform established facility tasks or study one advanced facility management approach.
Ames Research Center ARC5-20-09-AN	Spring, Summer, Fall	All	Electrical, Electronic, Computer Engineering, Computer Science	DAVANCED NETWROKING & OPTOMIZING END-TO-END COMMUNICATIONS: Advanced networking software tools, techniques, and technologies, for improved bandwidth, latency, reliability, and administration of supercomputing interconnects, LANs, and WANs.
Ames Research Center ARC5-21-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Computer Science Other: Psychology	DATA COLLECTION FOR EXPLORATION MISSION TEAM WORK SIMULATION: Exploration missions will involve distributed team collaboration and decision making, including space crews on the ISS or lunar surface and support personnel on earth. Interns will assist with data collection from laboratory and remote space analogue environments.
Ames Research Center ARC5-22-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Computer Science Other: Psychology	DATA ANALYSIS FOR EXPLORATION MISSION TEAM WORK SIMULATION: Exploration missions will involve distributed team collaboration and decision making, including space crews on the ISS or lunar surface and support personnel on earth. Interns will assist with data analysis from laboratory and remote space analogue environments.
Ames Research Center ARC5-23-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Computer Science	LAB SUPPORT FOR EXPLORATION MISSION TEAM WORK SIMULATION: Exploration missions will involve distributed team collaboration and decision making, including space crews on the ISS or lunar surface and support personnel on earth. Interns will assist with software installation, Windows and Linux system management for PC and Laptops.

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Ames Research Center ARC5-24-09-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	SMALL SPACECRAFT - MISSION DESIGN: Small spacecraft show great promise for future NASA missions. Because of their nature, these spacecraft typically have very low margins in mass, power, and propulsion. In order to make these systems viable, NASA needs evaluate what is possible with innovative concepts for microspacecraft landers, rovers, and communications relays that could be used for very low cost robotic lunar precursor missions. This project focuses on innovative mission concepts for specific targets.
Ames Research Center ARC5-25-09-AN	Spring, Summer, Fall	All	Electrical, Electronic, Computer Engineering, Computer Science	NASA TECHNOLOGY DATABASE: Assist researchers in the determination of technology that affect ESMD mission using next generation of NASA Technology Database and explore approaches for improving NASA Technology Transfer meeting OMB Requirements Interns will help model aspects of the technology descriptions and maturity control and collect and analyze data as needed.
Ames Research Center ARC5-26-09-AN	Spring, Summer, Fall	All	Electrical, Electronic, Computer Engineering, Computer Science	INFRASTRUCTURE FOR SUPERCOMPUTING SECURITY MANAGEMENT: This project is to improve management tools for NASA supercomputing security. Interns are expected to study various security mangement tools and work to enhance their capability. This will involve prototyping of security management software services.
Ames Research Center ARC5-27-09-AN	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering	SPACECRAFT HANDLING QUALITIES PROJECT: Assist researchers in the determination of factors that affect handling qualities for the next generation of NASA spacecraft and explore approaches for improving these handling qualities. Interns will help model aspects of the spacecraft control sytem, run experiments in the Vertical Motion Simulator, and collect and analyze data.

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Ames Research Center ARC5-28-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Biomedical Engineering, Computer Science	INFORMATION DISPLAY FORMATE FOR SURFACE EXPLORATION SPACE SUITS: Alternative system architectures and display formats will be analyzed to determine appropriate designs for space suit information displays to be used during planetary exploration. Analyses will be based on optical, biomechanical, perceptual and cognitive features of the systems displays and controls.
Ames Research Center ARC5-29-09-AN	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Computer Science	DATABASE DEVELOPMENT FOR ALTAIR (LUNAR LANDER) PROJECT: This project focuses on creation and development of a database for Altair (Lunar Lander). The work involves designing and developing user interfaces for system design engineers. Interns are expected to gather requirement, model interface, and develop prototypes and get users' feedback. Flex and Flash will be used.
Ames Research Center ARC5-30-09-AN	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Physics, Computer Science	FAULT DETECTION, DIAGNOSTICS, AND RESPONSE FOR ARES I: This project focuses on develop a fault detection, diagnostics and response system for the next generation of NASA rocket. Interns will help model aspects of the rocket monitoring, control sytem, develop experiments to be run in the simulator, and collect and analyze data.
Ames Research Center ARC5-31-09	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering, Biomedical Engineering, Chemical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	EXPLORATION LIFE SUPPORT SYSTEM - AIR: NASA's Exploration Life Support program is charged with developing the advanced technologies and systems that support humans in extends space exploration. Advanced technology development areas required for future human missions includes: atmosphere revitalization, water recovery, waste processing and sensors. This project will focus on atmosphere revitalization.
Ames Research Center ARC5-32-09	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering, Biomedical Engineering, Chemical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	EXPLORATION LIFE SUPPORT SYSTEM - WASTE MANAGEMENT: NASA's Exploration Life Support program is charged with developing the advanced technologies and systems that support humans in extends space exploration. Advanced technology development areas required for future human missions includes: atmosphere revitalization, water recovery, waste processing and sensors. This project will focus on waste management/resource recover.

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Ames Research Center ARC5-33-09-AN	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering, Biomedical Engineering, Chemical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	EXPLORATION LIFE SUPPORT SYSTEM - WATER RECOVERY: NASA's Exploration Life Support program is charged with developing the advanced technologies and systems that support humans in extends space exploration. Advanced technology development areas required for future human missions includes: atmosphere revitalization, water recovery, waste processing and sensors. This project will focus on water recovery.
Ames Research Center ARC5-34-09-AN	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering, Biomedical Engineering, Chemical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	EXPLORATION LIFE SUPPORT SYSTEM - BIOSENSORS: NASA's Exploration Life Support program is charged with developing the advanced technologies and systems that support humans in extends space exploration. Advanced technology development areas required for future human missions includes: atmosphere revitalization, water recovery, waste processing and sensors. This project will focus on biosensors/biochemistry.
Ames Research Center ARC5-35-09	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering, Mechanical Engineering, Mechanics	CFD APPLICATIONS - GRID GENERATION: Assist in development of CFD grid generation over complex aerodynamic shapes in support of aeronautic and space applications. Interns are expected to use existing software packages to generate grids for the purpose of creating aerodynamic databases.
Ames Research Center ARC5-36-09-AN	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering, Mechanical Engineering, Mechanics	CFD APPLICATIONS - RESULT ANALYSIS: Assist in development of CFD result generation over complex aerodynamic shapes in support of aeronautic and space applications. Interns are expected to use existing software packages to generate solutions for a wide variety of applications for the purpose of creating aerodynamic databases.
Ames Research Center ARC5-37-09-AN	Spring, Summer, Fall	Spacecraft	Electrical, Electronic, Computer Engineering	PHOTONIC OR ELECTRONIC HIT INDICATOR: MMOD impact detector for Orion: Further advance a detector to determine the extent of MMOD damage to the Orion vehicle for its ISS and Lunar missons. This detector has a low false positive rate, uses minimial spacecraft resources and is based on a DoE system used to determine strikes on ballistic missile targets.

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Ames Research Center ARC5-38-09-AN	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Engineering Physics, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Mathematics, Applied Mathematics, Computer Science	PROGNOSTICS FOR COMPLEX SYSTEMS -DAMAGE PROPATATION MODELING: The Prognostics Center of Excellence at NASA Ames Research Center is conducting research in systems health management. This involves the early assessment of abnormal conditions and damage as well as the estimation of "remaining life" of a component or subsystem. The goal is to research damage propagation mechanisms and to model damage using a physics-based approach for select application domains (e.g., power semiconductors, electro-mechanical actuators, composite structures, batteries. This project has a strong experimental component in the lab of the Prognostics Center of Excellence
Ames Research Center ARC5-39-09-AN	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Engineering Physics, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Mathematics, Applied Mathematics, Computer Science	PROGNOSTICS FOR COMPLEX SYSTEMS - DEMONSTRATION TESTBED: The Prognostics Center of Excellence at NASA Ames Research Center is conducting research in systems health management. This involves the early assessment of abnormal conditions and damage as well as the estimation of "remaining life" of a component or subsystem. This project is a hands-on project. The goal is to implement damaged components into a testbed involving a real subsystem typically found in space application domains. The task includes data acquisition, controls, and data analysis.
Ames Research Center ARC5-40-09-AN	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Engineering Physics, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Mathematics, Applied Mathematics, Computer Science	PROGNOSTICS FOR COMPLEX SYSTEMS: The Prognostics Center of Excellence at NASA Ames Research Center is conducting research in systems health management. This involves the early assessment of abnormal conditions and damage as well as the estimation of "remaining life" of a component or subsystem. The project involves both an experimental phase as well as analysis of data. The goal is to contribute to the understanding of how systems fail and how to predict failure. Prospective candidates should be comfortable in using algorithm prototyping languages like matlab

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Dryden Flight Research Center DFRC1-07-09-SU	Summer	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Astronomy, Astrophysics	LINEAR MOTOR LAUNCH ASSIST: Intern will work with NASA Mentor to model and develop dynamic-simulations for linear motor launch assist concepts.
Dryden Flight Research Center DFRC1-08-09-SU	Summer	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	LUNAR LANDE SIMULATOR: Intern will work with NASA Mentor to develop interactive desktop lunar lander simulator that models the terminal phase of the lunar landing including the "gravity turn" and landing site selection. Intern will also aid in development of simulators of earth-based landing training vehicle, and perform flying quality comparisons to lunar landing simulation.
Dryden Flight Research Center DFRC4-01-09-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	FLIGHT ABORT TEST PROGRAM
Dryden Flight Research Center DFRC4-02-09-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	FLIGHT ABORT TEST PROGRAM
Dryden Flight Research Center DFRC4-05-09-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Mathematics, Applied Mathematics, Computer Science	FLIGHT ABORT TEST PROGRAM: Systems Engineering

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Dryden Flight Research Center DFRC4-06-09-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Mathematics, Applied Mathematics, Computer Science	FLIGHT ABORT TEST PROGRAM: Project Planning and Control Analyst (includes Risk Management, Resources/Budgeting, Scheduling, Contracts and Public Affairs
Glenn Research Center GRC1-01-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Chemical Engineering, Civil Environmental, Health Engineering, Engineering Physics, Mechanical Engineering, Mechanics	GRC AW1: Excavation, Traction, and Material Flowability Measurements: Establish preparation recipes for lunar-equivalent soil using triaxial shear tests, penetration tests, and shear vane test. Use available wheel constructions to determine traction on lunar-equivalent soils under a matrix of operating conditions. Acquire excavator blades and measure the horizontal and vertical forces to dig in lunar-equivalent soil. Test validity/accuracy of traditional granular flow equations on lunar-equivalent soil seeking to identify the physics-based parameters that may be key to flow. All to develop test bins and validation tools for engineering design of surface systems.
Glenn Research Center GRC1-02-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Chemical Engineering, Civil Environmental, Health Engineering, Engineering Physics, Mechanical Engineering, Mechanics	GRC AW2: Finite Element, Mesh Free, and Discrete Element Modeling Calculation to reproduce simple measurements above (GRC AW1): Execute in a high performance computing environment at GRC. From this determine what particle parameters are needed to get responses equivalent to lunar soil. This is a building block for future more complicated simulations. All intended to develop modeling capacity that reduces lunar surface field testing during surface system design and build work in the future.

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Glenn Research Center GRC1-07-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Chemistry	LUNAR DUST: Lunar dust is a major issue for materials and equipment used on the moon. Developing an understanding of the effect of dust on various materials used in space suits which will be exposed to lunar dust is necessary for up-coming missions. Baseline studies of space suit samples exposed to dust in the Apollo program using microscopy and other chemical analysis will be carried out based on availability. A selection of fabrics and other materials proposed to be used in advanced surface suits for up-coming missions will be exposed to lunar dust simulants, analyzed and compared to previous results.
Glenn Research Center GRC1-08-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Chemistry	MONOLITH TESTING: Silica aerogels are attractive candidates for unique thermal, optical, catalytic, and chemical applications because of their low density and high mesoporosity. However, their inherent fragility has restricted their use to applications where they are not subject to load. Crosslinking silica aerogels with polymer significantly increases the strength of the aerogel with only a small effect on density or porosity. In addition, at very low densities, the aerogels crosslinked with a di-isocyanate are somewhat flexible. To enhance this property and make the monoliths more robust, synthesis of different formulations using more flexible linkages in the polymer backbone is proposed. Characterization and mechanical testing will be done on the monoliths produced and the properties will be optimized.
Glenn Research Center GRC1-09-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Mechanical Engineering, Mechanics	SIMULATED LUNAR OPERATION: Mechanical systems for the next generation lunar rover are developed and tested. The Simulated Lunar OPEration (SLOPE) facility provides a test vehicle and environment of simulated lunar surface terrain including sloping section. Possible research topics are terramechanics (interactions between wheels and various terrains), drive train, and suspension. Interns will assist with design and fab of components and/or conducting experiments to validate performance.

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Glenn Research Center GRC1-17-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Physics, Mathematics, Applied Mathematics	NAVIGATION FOR LUNAR AND PLANETARY SURFACE SYSTEMS: The student will develop performance analysis of lunar navigation systems in support of geo-locating systems for the planetaryEVA suit. The student will use and extend existing software tools that are part of the Space Navigation Computational Laboratory (SNCL). The student will employ Dilution-of-Precision (DoP), generalized DoP and full covariance-based techniques to analyze systems employing inertial, Earth-based and in-situ orbiting navigation resources for radiometric measurements
Glenn Research Center GRC4-10-09-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Mechanical Engineering, Mechanics	DEVELOPMENT OF CREW INJURY PREDICTION MODELS FOR ORION: The design of Orion requires that NASA develop a high fidelity understanding of the human body?s ability to withstand the landing forces generated by the vehicle during landing. Prediction of crew injuries during landing is critical to mission success and is a major design driver for the program. Currently the Brinkley model is used as the standard for crew injury predictions. This model is based primarily on empirical data and represents the human body analytically as a simple single degree-of-freedom oscillator in the spinal, side-to-side and chest in and out directions. The shortcoming of the Brinkley model is it is specifically designed for ejection seat injury predictions using a very specific seat arrangement and restraint system. The model is unable to assess the effects resulting from alternate seat designs, constraint systems, crew suits or helmets. Furthermore, the Brinkley model is based on limited test data and does not utilize the latest technology that is available from the automotive, aerospace or biomedical communities. More recently these industries have employed finite element technology to develop human body models to

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Glenn Research Center GRC4-15-08-SU	Summer	Spacecraft	Chemical Engineering, Electrical, Electronic, Computer Engineering	CHEMICAL SENSORS: The student will be involved in the characterization of fuel/gas leak sensors and environmental chemical sensors, processing of data associated with these sensors, and other activities associated with the Chemical Sensors Team for CLV, CEV and ISRU. The student will be involved in measurement of the response of a variety of different types of gas sensors in range of temperatures and environments. These sensor types include diodes, electrochemical cells, and resistors. This work will include operation of a gas sensor testing system, compiling the resulting data, and some computer programming. The gas sensor testing system is computer controlled with the ability to flow several gases over a wide flow range. The student will operate this gas sensor testing system and use it to characterize samples. Other duties in support of the chemical sensor program will be performed as assigned. An Electrical Engineering major is preferred with programming knowledge.
Glenn Research Center GRC4-20-09-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Chemical Engineering, Mechanical Engineering, Mechanics	ADVANCED COMBUSTION VIA MICROGRAVITY EXPERIMENTS (ACME): Contribute to the design of a set of 4 experiments planned for the Combustion Integrated Rack on the International Space Station. Working with combustion scientists, study gas-fueled, non-premixed, laminar diffusion flames in 1D or 2D geometries. For example, investigate the effect of an electric field on chemiluminescent emission and flame stability. Develop and evaluate hardware and operational concepts through ground-based experiments in normal gravity and microgravity (via drop testing). Test the function and reliability of instruments and other hardware elements such as the burners and igniter.

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Glenn Research Center GRC4-21-09-AN	Spring, Summer, Fall	Spacecraft	Chemical Engineering, Mechanical Engineering, Mechanics	FIRE PREVENTION IN MICROGRAVITY: A spacecraft fire is one of major safety concerns for manned space crafts and lunar habitats. Student internship opportunities exist in the fire prevention area where flammability of materials is tested in normal gravity and in microgravity using the NASA Glenn Zero Gravity Facility. The normal gravity tests are geared toward either understanding the relevance of NASA?s current material flammability screening test methods or simulating the reduced gravity environment through scaling laws.
Goddard Space Flight Center GSFC1-03-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Mathematics, Applied Mathematics	LUNAR TERRAIN CATEGORIZATION: Surface mission operational planning has been identified as one area of special interest within the Scientific Context of the Moon Exploration. Specifically, technologies that will enable scientists to perform terrain categorization, and in particular to detect, identify and characterize rocks, will be studied. Once lunar data is geo-registered & mosaiced to a common Lunar Geodetic Grid, these tools will assist scientists in determining general regions of interest, in performing precise targeting of specific types of samples, & in avoiding hazardous landing sites. Regions of interest will mainly be determined by understanding and characterizing potential lunar resources (minerals, ice, etc.) and their spatial distribution, their abundance, density, and distribution, relative to future missions and in-situ instruments that will be needed to perform additional detailed analyses. Rock identification will play an essential role in targeting specific samples, and rock location and distribution will be essential for selecting landing sites while avoiding hazards. Another importance tool in selecting landing sites will be accurately compute slopes and surface roughness parameters, from laser
Goddard Space Flight Center GSFC1-05-08-SU	Summer	Lunar & Planetary Surface Systems	Electrical, Electronic, Computer Engineering, Optics, Physics, Other	OPTICAL PARAMETRIC OSCILLATOR (OPO): Development of an Ytterbium (Yb)-fiber laser pumped Optical Parametric Oscillator (OPO) for an atmospheric methane measurement instrument.

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Goddard Space Flight Center GSFC1-33-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Electrical, Electronic, Computer Engineering, Atmospheric Sciences, Geosciences, Natural Resource Management	INVERSE SYNTHETIC APERTURE RADER (ISAR) FOR INTERIOR MAPPING OF ASTROID: This project has a goal to develop hardware and software for low frequency wideband step frequency ISAR radar. Low frequency ISAR are used to image interior structure of an unknown target such as asteroid/comet and other planetary bodies. ISAR consists of three basic subsystems: (1) Base band signal generation and based ban I & Q data processing, (2) Analog RF front end, and (3) Antenna. Using either Xilnix/Altera FPGA board and Analog Devices' DDS chips entire base band operation will be programmed and implemented. The analog RF front end will be assembled from commercially available RF components. The data acquisition and processing will be implemented through FPGA. Development of data processing algorithm to form a 2-D image of interior portion of a target will also be part of this project.
Goddard Space Flight Center GSFC1-34-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Chemistry, Geosciences, Astrobiology	ORGANIC COMPOUND ANALYSIS OF MARS ANALOGUES: Gas chromatograph mass spectrometer analysis of Mars analogues.
Goddard Space Flight Center GSFC1-35-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Engineering Physics, Mechanical Engineering, Mechanics, Astronomy, Astrophysics, Geography, Geosciences, Mathematics, Applied Mathematics, Computer Science	LUNAR TRANSVERS MAP CONTEST: Next year more than 3 billion dollars of new lunar data will start to flow in a torrent. We are designing an educational outreach effort setting up a competitive mission design by students for the most basic types of lunar robots.

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Goddard Space Flight Center GSFC1-36-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering Other: Computer Software Engineering	COMMUNICATIONS, STANDARDS & TECHNOLOGY LABORATORY: The student intern will participate in the development & integration of technologies and systems into the GSFC Communications, Standards, & Technology Laboratory (CSTL). The CSTL is a facility capable of testing and demonstrating complete end-to-end mission communications scenarios from on board spacecraft computer systems through spacecraft busses and RF communications systems, ground station RF systems, terrestrial networking systems, to the mission control center. The work available ranges from software development to digital and RF hardware design. Current activities include demonstrations and development of Lunar Surface communications scenarios.
Goddard Space Flight Center GSFC1-39-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Chemical Engineering, Engineering Physics, Materials, Metallurgical Engineering, Chemistry, Physics	DUST ENVIRONMENTAL EFFECTS PARTICULATE (DEEP) CHAMBER: The student intern will provide support in assembly and chamber operation for testing mechanisms and other spacecraft components in a lunar dust environment. Chamber internal designs will need to be accomplished for proper testing as well as complying with safety requirements.
Goddard Space Flight Center GSFC2-02-08-AN	Spring, Summer, Fall	Ground Operations	Electrical, Electronic, Computer Engineering, Computer Science, Other Other: Hardware & Software	EMBEDDED SCIENCE DATA PROCESSING APPLICATIONS USING HIGH PERFORMANCE HYBRID PLATFORMS: Work on a robotic path planning demonstration; R&D involving SAR and Hyper-spectral data processing; and robust software architecture that will help fly commercial processors reliably in a space-radiation environment. Students need to have C and/or VHDL experience, and combined hardware/software experience.
Goddard Space Flight Center GSFC2-06-08-SU	Summer	Ground Operations	Optics, Physics, Other Other: Physics & Engineering	DESIGN AND TESTING OF A HOLOGRAPHIC FILTER: Such narrow band optical filters are important in wavelength division multiplexed systems and very useful in optical communication systems.

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Goddard Space Flight Center GSFC4-14-08-SU	Summer	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Other Other: Computer Software Engineering	COMMUNICATIONS, STANDARDS & TECHNOLOGY LABORATORY: The student intern will participate in the development & integration of technologies and systems into the GSFC Communications, Standards, & Technology Laboratory (CSTL). The CSTL is a facility capable of testing and demonstrating complete end-to-end mission communications scenarios from onboard spacecraft computer systems through spacecraft busses and RF communications systems, ground station RF systems, terrestrial networking systems, to the mission control center. The work available ranges from software development to digital and RF hardware design.
Goddard Space Flight Center GSFC4-15-08-SU	Summer	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Civil Environmental, Health Engineering, Mechanical Engineering, Mechanics	STRUCTURAL VERIFICATION OF THE LUNAR RECONNAISSANCE ORBITER (LRO): The student intern will assist in the structural testing of the LRO spacecraft. These tests may include both vibration and acoustic tests. Pretest analysis will be performed and correlated to the test results.
Goddard Space Flight Center GSFC4-16-08-SU	Fall	Spacecraft	Electrical, Electronic, Computer Engineering	DEVELOPMENT OF A MOTOR/ACTUATOR CONTROLLER CORE FOR FLIGHT INSTRUMENT & SPACECRAFT MECHANISMS: Development of electronic circuits that will drive and control a precision mechanism actuator. Work will include fabrication of an electronic circuit and testing with a space flight actuator engineering unit to demonstrate all requirements can be achieved.

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Goddard Space Flight Center GSFC4-37-09-FA	Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	FPGA IMPLEMENTATION OF A MOTOR/ACTUATOR CONTROLLER CORE: New flight instrument and spacecraft mechanism control electronics increase the challenges for higher performance and safety parameters as well as low development cost. A promising technology that can help achieve this is "System-On-a-Chip", or SOC, where many functions are integrated onto a single integrated circuit. By using a single device instead of many, printed circuit board size can be dramatically reduced, which translates into size and mass savings. Typically, a SOC is developed by coding and stimulating each of the functions in a hardware description language (HDL). Integrating those functions into a system, stimulating and synthesizing the integrated system for implementation on a field programmable gate array (FPGA). The ability to use these coded functions as "intellectual property cores" (IP cores) in multiple applications can significantly reduce development cost. However, one major obstacle to using SOC technology for many instruments is the lack of IP cores to perform motor and actuator control. This effort proposes to develop a motor/actuator control core (MACC) that will allow a complete instrument data system to be implemented on a
Goddard Space Flight Center GSFC4-38-09-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Engineering Physics, Mechanical Engineering, Mechanics, Physics	COMPOSITE MATERIAL LAB: Hands on Internship - Multiple Programs: Multiple Composite Structure Programs.
Jet Propulsion Laboratory JPL1-01-08-SU	Summer	Lunar & Planetary Surface Systems	Electrical, Electronic, Computer Engineering, Computer Science	Planetary exploration requires greater awareness of the environment around so robotic platforms and habitats can function effectively. In this context, 360 degree vision greatly improves situational awareness. The internship will engage students in developing image processing software and the integration with hardware.
Jet Propulsion Laboratory JPL1-03-09-SU	Summer	Lunar & Planetary Surface Systems	Electrical, Electronic, Computer Engineering	Self-reconfigurable architectures for reuseable Space systems

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Johnson Space Center JSC1-01-08-6M	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Chemical Engineering, Electrical, Electronic, Computer Engineering, Chemistry, Other Other: Chem E, Chemistry/Electrochemistry, EE	BATTERY MODULES WITH POLYMER LITHIUM-ION CELLS: student researcher is required to assist in the design and development of battery modules A student researcher is required to assist in the design and development of battery modules with polymer lithium-ion cells. The battery modules will be tested in ambient as well as vacuum environments for performance as well as safety. Lunar and planetary surface systems will require that they be exposed to extreme temperatures and testing will be performed at worst case hot and cold temperatures. Perform survey on polymer lithium-ion cells used in commercial, military and space applications. Study polymer cell electrode design configurations from different manufacturers. Survey of successful long-term operation and perform analysis that may relate cell design to long life.
Johnson Space Center JSC1-08-08-4M	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Biochemistry, Biophysics, Microbiology, Bacteriology, Other Other: environmental microbiology, biogeochemistry, air revitalization, and electron microscopy	CYANOBACTERIA BIOREACTOR: A new project has been started in In-situ Resource Utilization for the moon. This project consists of a bioreactor that uses cyanobacteria to attack and corrode lunar soil in order to extract useful products (oxygen, iron, silicon) for use on the moon. It will use a unique bioreactor design in which fiber optics light pipes provide light energy to the cyanobacteria. The resulting biomass is recycled after removal of the desired resources. This project requires knowledge of general and molecular microbiology, general and analytical chemistry, basic biotechnology and engineering. Student needs experience with a Scanning Electron Microscope, and has a knowledge of interactions between bacteria and minerals.
Johnson Space Center JSC1-18-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Chemical Engineering, Mechanical Engineering, Mechanics, Chemistry Other: Undergrad or Graduate level	IN-SITU RESOURCE UTILIZATION: Student Intern will participate in the design of in-situ resource utilization oxygen production pilot plants. These plants will produce pure oxygen from lunar regolith (soil) to enable a sustainable lunar outpost.

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Johnson Space Center JSC1-21-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	PROTON EXCHANGE MEMBRANE FUEL CELLS: Fuel cells are likely to be key to lunar lander and lunar outpost operations. Key to developing lightweight and reliable fuel cell plants is the ability to manage reactants and water with no active pumps or other components. An intern would examine the technologies needed for passive reactant control, passive cooling, and water removal by wicking. Prototyping of one or many of these technologies is desirable.
Johnson Space Center JSC1-22-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Computer Science	ACTIVE RESPONSE GRAVITY OFFLOAD SYSTEM (ARGOS): ARGOS will use electro-mechanical devices and sensors to compensate for the difference between earth and lunar gravity, while keeping the actuation point above the center of gravity during translations. Of interest to NASA is a control algorithm that will command the motors in response to the astronaut?s movements with negligible lag time.
Johnson Space Center JSC1-23-09-AN	Spring, Summer, Fall	Spacecraft	Electrical, Electronic, Computer Engineering	ITU STANDARD G.729 (CS-ACELP and G.722.2 (AMR-WB) SPEECH COMPRESSION CODECS ON FPGA TARGET: These codecs are typically implemented on Digital Signal Processors (DSP). Constellation wants to implement the codecs on an FPGA so that redundant data-bus audio packet management, speech signal extraction and compression can happen on a single chip, minimizing mass, power and size requirements.

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Johnson Space Center JSC4-09-08-AN	Spring, Summer, Fall	Spacecraft	Biomedical Engineering, Biology, Other Other: Grads/undergrads biology, physiology, biomedical engineering, human factors, kinesiology	ASTRONAUT PHYSIOLOGICAL CHANGES: Astronauts experience alterations in multiple physiological systems following their return to Earth due to adaptive responses that occur during exposure to the microgravity conditions of space flight. These changes may lead to disruption in the ability to ambulate and perform functional tasks during the initial reintroduction to a gravitational environment following a prolonged transit. These disturbances may cause decrement in performance of operational tasks immediately following landing on a planetary surface. Therefore, the goals of this interdisciplinary project are to: 1) Develop a set of functional tests for pre and postflight testing of astronauts; 2) determine the effects of short and long-duration space flight on functional performance and 3) map the relationship between changes in functional performance and the physiological alterations that occur as a result of exposure to space flight.
Johnson Space Center JSC4-12-08-SU	Summer, Fall	Spacecraft	Engineering Physics, Physics	MATERIAL SCIENCE OF MANNED SPACECRAFT RADIATION SHIELDING: This internship will involve examining crew dose, materials dose, and avionics single event effects (SEE) environments and how it is affected by manned spacecraft radiation shielding. The intern will use the FLUKA (http://www.fluka.org/) ionizing radiation transport code to explore the effectiveness of various materials and materials combinations in attenuation of galactic cosmic ray and solar cosmic ray dose to the interior of relatively massive (compared to robotic vehicles) manned spacecraft. The objective here is to compare different materials in simple geometries so that materials effects on secondary particle production and stopping power can be determined and visualized directly with no complications from specific spacecraft configuration effects. Validation of the FLUKA tool against available space flight data and ground based accelerator data is an essential part of the project.

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Johnson Space Center JSC4-13-08-SU	Summer, Fall	Spacecraft	Engineering Physics, Physics	GEOMAGENTIC STORMS, TRAVELING IONOSPHERIC DISTURBANCES (TIDs), AND SOLAR CYCLE EFFECTS ON NEUTRAL ATMOSPHERE: The objective of this internship is to evaluate existing (albeit cutting edge) tools used to predict the scale of the ISS attitude control or satellite drag anomalies expected as a result of geomagnetic storm events or as the upper atmosphere become immediately denser during geomagnetic storms and gradually denser as we approach the upcoming solar maximum, the magnitude and character of which is proving more difficult to predict than was the case for the last several solar maxima.
Johnson Space Center JSC4-14-08-SU	Summer, Fall	Spacecraft	Engineering Physics, Mechanical Engineering, Mechanics, Physics	INTERNATIONAL SPACE STATION AS NANO/MICRO SATELLITE BASE: This effort is an evolution of the sounding rocket base (Wallops, White Sands, Poker Flats etc.) idea as suggested by the free launch services provided for micro satellite and nano satellites by ESA on the Arianne launcher and used extensively by Surrey Satellite customers. Specifically, the intern will need to provide a report with the following information: a) Feasibility - assessment of earth-to-orbit transportation opportunities to ISS in the post Shuttle era. b) Concept - multi-satellite carrier to attach to ISS externally and provide controlled mechanical deployment/launch over some range of vectors compatible with ISS safety (collision avoidance). c) Launch opportunities for satellite carrier assembly - Progress, Soyuz, ESA/ATV, JAXA/HTV, Commercial Carriers (COTS Program), Orion. d) Matching the concept to the agency road maps and science objectives/needs of, for example, the National Science Foundation, NASA Science Mission Directorate, and the National Oceanics and Atmospherics Administration.
Kennedy Space Center KSC1-05-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Chemical Engineering, Civil Environmental, Health Engineering, Mechanical Engineering, Mechanics, Physics	EROSION OF LUNAR/MARTIAN SOIL BENEATH ROCEKT EXHAUST PLUME: Perform experiments to improve our understanding of the physics of the erosion of lunar/martian soil beneath a rocket exhaust plume, the processes of cratering and scour-hole formation in the soil, the aerodynamic forces upon the blowing particulates and larger ejecta, their trajectories, and the damage they may cause upon impact with spaceflight hardware.

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Kennedy Space Center KSC1-06-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Chemical Engineering, Mechanical Engineering, Mechanics, Physics	SIMULATE THE BLOWING OF SOIL AND/OR CRATERING BENEATH LANDERS: Developing techniques to numerically simulate the blowing of soil and/or cratering beneath the engines of lunar and martian landers, validating the simulations by comparison with the Apollo landing videos, Surveyor III damage, Mars imagery, and terrestrial experiment data, and using the simulations in trade studies to determine how to develop landing zones that will control the blast effects and protect both the landing vehicle and the lunar/martian outpost
Kennedy Space Center KSC1-07-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Civil Environmental, Health Engineering, Mechanical Engineering, Mechanics, Other Other: Robotics, Mining Engineering	DEVELOPING SURFACE SUPPORT EQUIPMENT: Interns will be involved in developing surface support equipment required to deploy and operate a Lunar Outpost. Examples include spacecraft servicing on the Lunar Surface, emplacement of Outpost assets & cargo and production & distribution of surface consumables such as Liquid Oxygen
Kennedy Space Center KSC1-08-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Civil Environmental, Health Engineering, Mechanical Engineering, Mechanics, Other Other: Robotics, Mining Engineering	IN-SITU UTILIZATION (ISRU) TECHNOLOGIES: Regolith Excavation is required for Oxygen Production and Lunar Outpost Construction. Technologies and mechatronic systems will be developed to syupport ISRU methods and goals.
Kennedy Space Center KSC1-09-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Chemical Engineering, Mechanical Engineering, Mechanics, Biology, Microbiology, Bacteriology, Other Other: Biological/Agricultural Engineering, Molecular/Microbiology	EXPLORATION LIFE SUPPORT PROJECT OF ESMD: Water Recovery Systems (WRS) Element by characterization of the microbial communities in water processed and stored for CEV; Waste Management Systems (WMS) Element by characterization of the microbial communities in solid waste solid waste compacting, storage and safing development for CEV; Habitation Element by developing efficient, high quality lighting systems for CEV, LSAM, and surface systems, including the use of LED and direct solar light capture systems with acceptable spectrum for human vision; Air Revtalization Element (ARS) by testing (COTS) polymer adsorbents for filtering trace contaminants found in cabin air; and developing a hypobaric test capability for assessing environmental and chemical sensors / detectors for CEV and Lunar landing applications

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Kennedy Space Center KSC2-01-08-AN	Spring, Summer, Fall	Ground Operations	Electrical, Electronic, Computer Engineering, Computer Science, Other Other: Simulation/Digital Media	DATA PRESENTATION & VISUALIZATION: Advancing technologies that support Data Presentation & Visualization which is part of ESMD; KSC Lead Center for this initiative
Kennedy Space Center KSC2-02-08-AN	Spring, Summer, Fall	Ground Operations	Other Other: Simulation	SIMULATION INTEGRATION: Improved discrete event simulation integration
Kennedy Space Center KSC2-03-08-AN	Spring, Summer, Fall	Ground Operations	Civil Environmental, Health Engineering, Electrical, Electronic, Computer Engineering, Industrial, Manufacturing Engineering, Mechanical Engineering, Mechanics, Computer Science, Other Other: Simulation, Human Factors, Anthropology, Phsychology, Graphic Arts	SIMULATION TOOLS: Evaluate and improve the usability and human factors of simulation tools
Kennedy Space Center KSC2-04-08-AN	Spring, Summer, Fall	Ground Operations	Electrical, Electronic, Computer Engineering, Computer Science, Other Other: Simulation/Education	ESMD DISTRIBUTED OBSERVER NETORK (DON): Innovative uses of ESMD's Distributed Observer Network for education & other NASA purposes (KSC POC to interface w/Snr Pjt Team)
Kennedy Space Center KSC2-17-09-AN	Spring, Summer, Fall	Ground Operations	Electrical, Electronic, Computer Engineering, Industrial, Manufacturing Engineering, Computer Science	SIMULATION TOOLS: Development of a simulation tool to assist planning, scheduling and integrating the KSC ground processing tasks involved in preparing the ISS Orbital Replacement Units and payloads that will be launched on Visiting Vehicles. These vehicles include Japan's HTV, to be launched from Tanegashima, Japan; ESA's ATV to be launched from Kourou, French Guiana; CEV/Orion to be launched from KSC; and commercial vehicles to be launched from a TBD site. Appropriate for -- Industral Engineering or Computer Science/Engineering. Specialized Skills Required -- Experience with simulation tools beneficial but not required

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Kennedy Space Center KSC2-18-09-AN	Spring, Summer, Fall	Ground Operations	Aerospace, Aeronautical, Astronautical Engineering, Biomedical Engineering, Chemical Engineering, Civil Environmental, Health Engineering, Electrical, Electronic, Computer Engineering, Industrial, Manufacturing Engineering, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics	LIFE CYCLE COSTS FOR AUTOMATING SPACECRAFT PROCESSING FUNCTIONS: For this project, a model/tool to be used in forecasting lifecycle costs for different systems/operations will be developed. This may include cost/benefit analysis for automating certain spacecraft processing functions such as fueling and pressurization, versus performing these functions manually. Appropriate for ? any engineering discipline. Specialized Skills Required ? Industrial Engineering field of specialization helpful but not required
Kennedy Space Center KSC2-19-09-AN	Spring, Summer, Fall	Ground Operations	Aerospace, Aeronautical, Astronautical Engineering, Biomedical Engineering, Chemical Engineering, Civil Environmental, Health Engineering, Electrical, Electronic, Computer Engineering, Industrial, Manufacturing Engineering, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Nuclear Engineering	ELECTRONIC WORK CONTROL AND WORK AUTHORIZATION APPLICABILITY AT KSC: This project will involve a survey of KSC operations and an assessment of the applicability of electronic work control (Work Authorization Documents) systems in use in the aerospace industry and especially at KSC for a recommendation of a system or type of system. Appropriate for ? any engineering discipline. Specialized Skills Required ? Industrial Engineering field of specialization helpful but not required

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Kennedy Space Center KSC2-20-09-AN	Spring, Summer, Fall	All	Aerospace, Aeronautical, Astronautical Engineering, Biomedical Engineering, Chemical Engineering, Civil Environmental, Health Engineering, Electrical, Electronic, Computer Engineering, Industrial, Manufacturing Engineering, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Nuclear Engineering	INTERNATIONAL SPACE STATION (ISS) STRATEGIC OUTREACH TO GEN Y: Capitalizing on the global characteristic of the ISS, this project will develop communication strategies and tools for disseminating information about ISS milestones, accomplishments, and missions to the Gen Y audience in order to help them assume their role as active participants and stakeholders in NASA's goals. See "NASA Gen Y PowerPoint presentation" available on various public web sites for example reference information. Appropriate for ? any engineering discipline Communication skills needed
Kennedy Space Center KSC2-21-09-AN	Spring, Summer, Fall	Ground Operations	Aerospace, Aeronautical, Astronautical Engineering, Biomedical Engineering, Chemical Engineering, Civil Environmental, Health Engineering, Electrical, Electronic, Computer Engineering, Industrial, Manufacturing Engineering, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Nuclear Engineering	SPACE STATION PROCESSING FACILITY OPERATIONS AND MAINTENANCE COST EVALUATION: This project will compare the Operations and Maintenance costs of the Space Station Processing Facility (SSPF) to the O&M costs of a similar building in industry. The intern will analyze other models of operation and opportunities for improvement to facilitate continued usage of the SSPF asset for Constellation.

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Kennedy Space Center KSC2-22-09-AN	Spring, Summer, Fall	Ground Operations	Aerospace, Aeronautical, Astronautical Engineering, Biomedical Engineering, Chemical Engineering, Civil Environmental, Health Engineering, Electrical, Electronic, Computer Engineering, Industrial, Manufacturing Engineering, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Nuclear Engineering	KNOWLEDGE MANAGEMENT STRATEGY EVALUATION FOR THE TRANSITION FROM ISS TO SPACECRAFT PROCESSING: This project will involve an analysis of current knowledge management practices within International Space Station (ISS) flight system processing. Benchmarking and analysis of other best practices will be conducted. Proposal of a strategy for transitioning from current infrastructure to a recommended future state will be developed.
Kennedy Space Center KSC2-23-09-AN	Spring, Summer, Fall	Ground Operations	Industrial, Manufacturing Engineering	INITIAL LOGISTICS SUPPORTABILITY IN A LUNAR ENVIRONMENT: During this project, the intern will determine initial composition of spares based on lunar concept of operations, optimize packaging configuration, and identify maintenance scenarios based on potential failure modes and tools required. Industrial Engineering with logistics operations knowledge preferred
Kennedy Space Center KSC2-25-09-AN	Spring, Summer, Fall	Ground Operations	Aerospace, Aeronautical, Astronautical Engineering, Chemical Engineering, Engineering Physics, Industrial, Manufacturing Engineering, Nuclear Engineering	TELEMETRY SCREENING FOR VARIOUS VEHICLES: This project will involve using the IRIS software package utilized by the Launch Services Program to design telemetry screens for the various vehicles and their ground systems used by NASA when launching unmanned payloads. These telemetry screens will provide vital measurements to systems engineers in an organized manner for both ground testing and launch activities and may also provide calculations and graphical representations of incoming data measurements. The creation of these screens will require the student to develop basic knowledge of ground testing and operation of multiple launch vehicle systems.

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Kennedy Space Center KSC2-26-09-AN	Spring, Summer, Fall	Ground Operations	Electrical, Electronic, Computer Engineering, Engineering Physics, Industrial, Manufacturing Engineering	During this project, the intern will assist the Launch Command and Control Systems (LCS) Hardware Group in Hardware Configuration Item (HWCI) electromagnetic interference (EMC) testing. This effort inclues the development of susceptibility failure criteria and related requirements for all applicable LCS HWCI's.
Langley Research Center LRC1-01-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Civil Environmental, Health Engineering, Electrical, Electronic, Computer Engineering, Engineering Physics, Mechanical Engineering, Mechanics, Physics, Mathematics, Applied Mathematics, Computer Science, Other Other: Any major with strong programming background	Algorithm Development for Robotics Applications Using LABVIEW: This project involves the development of algorithms relating to autonomous mobility and navigation based on stereo, omni-directional, and thermal imagers. The intern should be interested in robotic systems and well-versed in computer programming.
Langley Research Center LRC1-03-08-SU	Summer	Spacecraft	Other Other: Communications; Media Production; Instructional Design	Distance Learning Modules for Tribal Schools: Participants will work with NASA Digital Learning staff to design and test distance learning modules intended for delivery via videoconferencing to Tribal schools. Specific desirable skills will support digital media production, research activities, and technical/media writing. Proficiency with PowerPoint, Photo Shop; and/or video editing software is recommended. Content for modules will be associated with lunar and planetary surface systems, propulsion, and spacecraft.

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Langley Research Center LRC1-04-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Civil Environmental, Health Engineering, Electrical, Electronic, Computer Engineering, Engineering Physics, Mechanical Engineering, Mechanics, Physics, Computer Science, Other Other: Any major with strong programming background	DESIGN AND INTEGRATION OF A ROBOTIC PLATFORM FOR SCIENCE INSTRUMENT TESTING: This project involves the development of software to support the operation of a robotic platform with application to the testing and deployment of science instruments. The tasks to be implemented include: image registration, behavioral robotic intelligence, and user interfaces for robot guidance and supervision. Ideal candidates for participation will be familiar with kinematics, machine pattern recognition, computer programming, and guidance and control.
Langley Research Center LRC1-17-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Engineering Physics, Optics, Physics, Atmospheric Sciences	LASER REMOTE SENSING: Development of Mid-IR Laser-Based Differential Absorption Lidar (DIAL) for Water Vapor Detection: Student will be involved in developing the capability (modeling and simulation) of sensing water vapor on Mars and in other planetary atmospheres using lidars. (There could be some test experiments provided students have requisite training in using lasers that include laser safety training and eye exams.)
Langley Research Center LRC1-18-09-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Engineering Physics, Optics, Physics, Atmospheric Sciences	LASER REMOTE SENSING: Design, Modeling, and Performance Simulation of Lidar Systems for Sensing Trace Gases: Lidars for sensing water vapor, ice, and several atmospheric trace gases are being investigated. Student will develop computer models for evaluating the merits of several lidar techniques for optimum system development. (There could be some test experiments provided students have requisite training in using lasers that includes laser safety training and eye exams.)

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Langley Research Center LRC1-19-09-SU	Summer	Lunar & Planetary Surface Systems	Computer Science, Other	DEVELOPMENT OF SPACE EXPLORATION INTERACTIVE SOFTWARE: Development of Space Exploration Interactive Software: The primary objective of this project is to develop interactive online software to compare space exploration with other exploration efforts throughout history. The modules/options would include transportation, survival in harsh environments, human needs, desirable locations for settlements (and why), the importance of water in exploration, and other topics unique to all exploration efforts. The software would provide a repository of images of maps that NASA has developed in planning for future missions
Langley Research Center LRC2-10-08-SU	Summer	Ground Operations	Aerospace, Aeronautical, Astronautical Engineering, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Other Other: Structural Analysis	INTEGRATED DIAGNOSTIC AND PROGNOSTIC AEROSERVOELASTIC METHODS FOR ADAPTIVE CONTROL SYSTEM: The purpose of this project is to develop integrated diagnostic and prognostic aeroservoelastic methods to generate static and dynamic load constraints due to structural damage and upset conditions for adaptive control system. The focus will be on the following: damage characterization and residual strength; rapid modeling and analysis methods; dynamic impact simulation; and probabilistic methods.
Langley Research Center LRC4-06-08-SU	Summer	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Mechanical Engineering, Mechanics	ANALYSIS OF DYNAMIC STABILITY EXPERIMENTAL DATA IN SUPPORT OF PROJECT ORION AND PLANETARY ENTRY CAPSULES: Dynamic stability data from various sources will be compared to better understand the strengths and weaknesses of different test techniques and facilities. This analysis will help identify the best facility to obtain data for different blunt body configurations and applications. The comparisons will also be used to quantify uncertainties on the measured aerodynamic coefficients and the sources of error in each facility.
Langley Research Center LRC4-08-08-SU	Summer	Spacecraft	Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Chemistry, Physics	NANOMATERIALS CHARACTERIZATION FOR AEROSPACE APPLICATIONS: Characterization and imaging of carbon nanotube networks in materials using Atomic Force Microscopy (AFM)

NASA Center Project Number	Timeframe Needed	ESMD Area	Desired Majors	Description
Langley Research Center LRC4-09-08-SU	Summer	Spacecraft	Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Chemistry, Physics	RESONANT DIFFERENCE FREQUENCY ATOMIC FORCE ULTRASONIC MICROSCOPY (RDF-AFUM): The RDF-AFUM technique employs an ultrasonic wave launched from the bottom of a sample, while the cantilever of an atomic force microscope, driven at a frequency differing from the ultrasonic frequency by one of the contact resonance frequencies of the cantilever, engages the to surface of the sample. The associated signals are used to create images of nano-scale near-surface and subsurface features.
Langley Research Center LRC4-16-09-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Engineering Physics, Mechanical Engineering, Mechanics, Physics	STRUCTURAL DYNAMICS BRANCH: Assessment of Uncertainty Quantification and Modern Design of Experiments (MDOE) for Impact Dynamics Applications: This work is important in the context of the Orion Landing System development application and has potential for future spacecraft and lunar-lander work. This work integrates two specialized areas - impact dynamics and uncertainty quantification (using probabilistic analysis). Impact dynamics is based on an understanding of the nonlinear, transient-dynamic behavior of structures. The quantification and propagation of a number of uncertainties will require the knowledge of probabilistic analysis. MDOE can be used to minimize or control some uncertainties. A graduate student would be best suited for this work. The student's effort will be in the application of probabilistic analysis for uncertainty quantification to an impact dynamics problem. In order to most effectively work on the project, the student should have knowledge in either nonlinear, transient-dynamic structures or probabilistic analysis. In addition, experience with finite-element modeling and signal processing would be helpful.
Langley Research Center LRC4-20-09-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Engineering Physics, Mechanical Engineering, Mechanics, Mathematics, Applied Mathematics	SYSTEMS ANALYSIS: Development of an ARES I Aerodynamic Database: The ARES I database will be derived from separate wind tunnel, CFD, and engineering code datasets. The work involves the integration of these separate items into a single database with routines being developed in MATLAB.

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Marshall Space Flight Center MSFC1-02-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Computer Science	EDUCATIONAL TEST BED FOR SURFACE MOBILITY STUDIES: The objective of this project is to develop and implement a testbed that may be used at a college or university for further research and technology development in surface mobility systems. During the summer the students will utilize commercial off-the shelf components e.g., radio controlled cars, computer to RC interface boxes, X-box controllers, PC computers and network cameras to develop a demonstration of automated way-point navigation. The network camera will be positioned over the area traversed by the RC car and image processing algorithms will be developed to determine the car's position and orientation that will be used in the closed loop control system. This position data will be used in place of GPS data and will allow the development of a small scale surface mobility simulator than can be implemented indoors. This system may be replicated back at the grantee's home institution and provide a low-cost test bed for further development in surface mobility related areas."
Marshall Space Flight Center MSFC1-03-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Computer Science	RADIATION EFFECTS ON ELECTRONIS MODELING: Develop advanced models of the natural radiation environment to diagnose and predict the effects of Single Event Effects (SEEs) on modern electronic architectures.
Marshall Space Flight Center MSFC1-04-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Electrical, Electronic, Computer Engineering, Computer Science	RECONFIGURABLE COMPUTERS: Provide reconfigurable computing capability, resulting in reduction of flight spares and risk reduction for limited circuit lifetimes.
Marshall Space Flight Center MSFC1-05-08-SU	Summer	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Chemical Engineering, Mechanical Engineering, Mechanics, Physics	TESTING AND DEVELOPING MATERIALS FOR SPACE EXPLORATION: Impact testing using a variety of projectiles simulating micrometeoroids, orbital and launch debris, and weather encounters (rain/hail) for testing and developing materials to ensure safer space exploration

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Marshall Space Flight Center MSFC1-09-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Civil Environmental, Health Engineering, Mechanical Engineering, Mechanics	LAB SUPPORT: Microwave/Millimeter Wave Nondestructive Evaluation (NDE) Lab support
Marshall Space Flight Center MSFC1-10-08-AY	Spring, Summer, Fall	Spacecraft	Electrical, Electronic, Computer Engineering, Mathematics, Applied Mathematics, Computer Science	UNIVERSAL MODULAR COMPUTING RESOURCES: Development of technology and demonstrations in advanced RC applications to universal modular computing resources for future Space Flight infrastructure. Work currently underway combines various schemes of software and hardware interaction to demonstrate physical and functional RC concepts. The ultimate product is a flight-qualified universal computing resource for use throughout future vehicle and surface systems.
Marshall Space Flight Center MSFC1-11-08-SU	Summer	Lunar & Planetary Surface Systems	Physics	PREDICTING SPACE RADIATION EXPOSURE: With longer duration and distance space flights becoming necessary, the ability to predict and simulate space radiation exposure due to galactic cosmic rays (GCR) is crucial. These predictions are commonly used in space weather simulations as well as in radiation exposure and protection studies for microelectronics and astronauts. This study focuses on four of the most widely used GCR models where they will be benchmarked and validated against a database consisting of both light and heavy-ion GCR data. This work will provide a foundation for updating the Cosmic Ray Effects on MicroElectronics (CREME) 1996 model, an effort that is currently underway by the Cosmic Ray group at MSFC.
Marshall Space Flight Center MSFC1-15-08-SU	Summer	Lunar & Planetary Surface Systems	Astronomy, Astrophysics, Physics	SPACE RADIATION: Modeling the space radiation environment

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Marshall Space Flight Center MSFC1-17-08-SU	Summer	Lunar & Planetary Surface Systems	Chemical Engineering, Materials, Metallurgical Engineering, Chemistry, Physics, Geosciences, Mathematics, Applied Mathematics Other: Mining Eng, Extractive Metallurgy, Geo Eng	REGOLITH SIMULANT DEVELOPMENT: MSFC is developing a method to create lunar regolith simulants that will match the properties of the lunar surface. This process involves understanding the lunar components and how to quantify and reproduce them, and how they mix together on the Moon. Knowledge of mining, milling, mineralogy, geology, image analysis, statistics, physics, engineering, chemistry and many other skills all have significant roles in the overall project. Areas of activity are constantly evolving as progress is made by the dynamic team reaching across the United States and internationally
Marshall Space Flight Center MSFC1-19-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Chemical Engineering, Mechanical Engineering, Mechanics, Nuclear Engineering, Physics	FISSION SURFACE POWER COMPONENT TESTING AND DEVELOPMENT: Involves analysis, design and testing of technologies for possible use in a fission reactor to power a lunar base. Involves thermodynamics, heat transfer, fluid flow, mechanical design, and hands-on laboratory operations. Current technologies include liquid metal pumps, flowmeters and heat exchangers, thermal fuel rod simulators, liquid metal corrosion and natural convection flow.
Marshall Space Flight Center MSFC1-20-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Mechanical Engineering, Mechanics, Nuclear Engineering, Physics	RADIOISOTOPE POWER SIMULATOR DEVELOPMENT AND TESTING: Involves analysis design and testing of thermal simulators of the General Purpose Heat Source module, a Plutonium radioisotope source used in NASA mission. Involves heat transfer, mechanical design and hands-on laboratory operations.
Marshall Space Flight Center MSFC1-36-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Aerospace, Aeronautical, Astronautical Engineering, Mechanical Engineering, Mechanics, Nuclear Engineering, Physics	FISSION SURFACE POWER: Fission systems could potentially provide abundant power anywhere on the surface of the moon or Mars. The intern would perform experimental work related to the design and development of fission surface power (FSP) systems for potential use on the moon or Mars. Work at MSFC is focused on testing related to the reactor and shield. Work could include completing experiments related to pump performance, heat exchanger performance, shield performance, integrated system performance, thermal simulator development, or other topics. Work may also be done in collaboration with other NASA centers (e.g. GRC).

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Marshall Space Flight Center MSFC1-46-08-AN	Spring, Summer, Fall	Lunar & Planetary Surface Systems	Chemical Engineering, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Chemistry, Physics, Geosciences, Other	IN-SITU FABRICATION & REPAIR/IN-SITU RESOURCE UTILIZATION/DUST MANAGEMENT PROJECT: Student would assist NASA project team in developing and advancing technologies required for returning to the Moon, establishing a lunar outpost and eventually exploring Mars and beyond. Multiple research and technology areas are under investigation which could enable self-sufficiency on the Moon by learning to utilize in situ lunar resources. Technologies the team is maturing include methods for extracting oxygen and metals from the lunar regolith, rapid-prototyping/fabrication, non-destructive evaluation (NDE), and repair. In addition, opportunities exist for student participation in developing and characterizing lunar simulants, including dust simulants, which closely replicate the lunar regolith.
Marshall Space Flight Center MSFC3-14-08-SU	Spring, Summer, Fall	Propulsion	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Computer Science	OFF-DESIGN ANALYSIS OF LIQUID ROCKET ENGINES: To further develop P-STAR, the first order modeling tool, by providing the capability to perform off-design analysis of liquid rocket engines, while improving performance, weight and cost predictions
Marshall Space Flight Center MSFC3-34-08-SU	Summer	Propulsion	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Physics	DESIGNING/MODELING/TESTING PLASMA DEVICES: Designing/modeling/testing various plasma devices, like space thrusters and pulsed plasma micrometeorite guns. Tasks include design/fabrication/use of plasma experiments and diagnostics, circuit design and analysis, data analysis, performance modeling.
Marshall Space Flight Center MSFC3-35-08-SU	Summer	Propulsion	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Physics	Designing and testing various flow components for use in a simulated nuclear reactor with application towards lunar and deep space power production. Specific work in design/build/test of liquid metal pumps and flow sensors that are compatible with the NaK (sodium-potassium eutectic) heat transfer fluid.

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Marshall Space Flight Center MSFC3-38-08-AN	Spring, Summer, Fall	Propulsion	Aerospace, Aeronautical, Astronautical Engineering, Industrial, Manufacturing Engineering, Mechanical Engineering, Mechanics	TURBOMACHINERY: Manufacturing methods/alternatives to produce small impellers (~2 Kpsi). Improving surface finish for rapid prototype manufacturing, particularly for small parts
Marshall Space Flight Center MSFC3-39-08-AN	Spring, Summer, Fall	Propulsion	Aerospace, Aeronautical, Astronautical Engineering, Industrial, Manufacturing Engineering, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics	PROPULSION SYSTEMS: The work consists of development, design, and testing of valves, valve actuators, lines (tubing assemblies), ducts (piping and flex-joints), and fluid systems, for liquid propellant rocket engines and vehicle main propulsion systems. Some fundamental tasks performed in the design and development process include conceptual design, fluid flow analysis, fluid mechanics, stress analysis, material selection, manufacturing technique selection, computer aided design (CAD) modeling, engineering drawing (drafting) preparation, test plan development, test procedure development, and testing. The intern will work with a mentor or senior engineer on a component design, development, and/or test task relating to the Ares Vehicle Program.
Marshall Space Flight Center MSFC3-42-08-AN	Spring, Summer, Fall	Propulsion	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Computer Science	PROGRAMMING A DIGITAL SIGNAL PROCESSOR: Development of general purpose electric solenoid valve controller with advanced diagnostic capabilities. Involves programming a Digital Signal Processor (DSP) with C++ language to create an "intelligent" controller which electrically senses the state of closure of the valve using a reference resonator loop and a real-time FFT algorithm. Also involves some simulation with "SPICE" circuit emulation software.
Marshall Space Flight Center MSFC4-01-08-SU	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics, Computer Science	ROBOTIC TESTING: Support the development and testing of robotic test platforms that are being modified.

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Marshall Space Flight Center MSFC4-08-08-SU	Summer	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Civil Environmental, Health Engineering, Mechanical Engineering, Mechanics	FLIGHT HARDWARE FABRICATION & TESTING: The intern will study and understand project requirements, develop concepts, do detailed design using 3D CAD modeling, use analysis tools to optimize components, do drawings to document the design, produce rapid prototypes of parts, and support flight hardware fabrication and testing.
Marshall Space Flight Center MSFC4-18-08-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Biomedical Engineering, Chemical Engineering, Civil Environmental, Health Engineering, Electrical, Electronic, Computer Engineering, Industrial, Manufacturing Engineering, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Nuclear Engineering, Other	LAUNCH VEHICLE LIFE CYCLE: Build a process which integrates both quantitative and qualitative safety, reliability and quality engineering in the life cycle of a launch vehicle (Ares I)
Marshall Space Flight Center MSFC4-41-08-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Materials, Metallurgical Engineering, Mechanical Engineering, Mechanics, Physics	TESTING AND DEVELOPMENT OF MICROMETEORITE GUN: Involves high voltage pulsed power, plasma, hypervelocity measurements, high speed imaging and diagnostics development for a facility for the study of micrometeorite impact. Specific areas of interest include the hypervelocity impact of small particles (10-150 um) with multi-layer cryogenic insulation samples at velocities of 20 km/sec. Diagnostics are needed for accurate size and speed measurements of these small hypervelocity particles.
Marshall Space Flight Center MSFC4-47-08-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Mechanical Engineering, Mechanics, Mathematics, Applied Mathematics, Computer Science, Other Other: Applied Physics	DEVELOPMENT AND APPLICATION OF STRUCTORAL/THERMAL ANALTYSIS AND DESIGN SOFTWARE TOOLS: Applications to spaceflight hardware and conceptual systems. Includes further development of NASA X-TOOLSS (eXploration Toolset for Optimization Of Launch and Space Systems) software. Also applies to: Lunar and Planetary Surface Systems

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Marshall Space Flight Center MSFC4-48-08-AN	Spring, Summer, Fall	Spacecraft	Aerospace, Aeronautical, Astronautical Engineering, Chemical Engineering, Mechanical Engineering, Mechanics, Mathematics, Applied Mathematics, Other Other: Applied Physics	THERMAL AND STRUCTURAL ANALYSIS: Opportunities include heat transfer, stress, fracture, fatigue, structural dynamics/loads, and vibroacoustics. Applications to spaceflight hardware and future lunar surface systems. Also applies to: Lunar and Planetary Surface Systems
Stennis Space Center SSC3-03-09-AN	Summer	Propulsion	Electrical, Electronic, Computer Engineering	RFID INSTRUMENT CALIBRATION DATA DEVICE: Design an RFID device to be placed on instrumentation and a read/write device so that a QA technician can easily check to see what the re-calibration date is, can set the new date and can interface this data with a computer system automatically.
Stennis Space Center SSC3-04-09-AN	Spring, Fall	Propulsion	Electrical, Electronic, Computer Engineering	STRAIN GAGE BONDING INTEGRITY MEASUREMENT DEVICE: Design an intelligent Integrated System Health Management (ISHM) detector for strain gages which will use capacitive coupling techniques and computer intelligence to determine whether the gage is still properly bonded to the subject material. It is difficult to determine whether an anomaly is caused by an actual adverse event or simply by the strain gage losing integrity. This must be done in real time.
Stennis Space Center SSC3-05-09-AN	Spring, Fall	Propulsion	Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	CHARACTERIZATION OF STRAIN LEVELS IN U-SHAPED CONVOLUTES ON CRYOGENIC EXPANSION JOINTS: Collecting and analyzing strain readings from U-shaped convolutes for clarifying instrumentation techniques in support of rocket propulsion testing. The strain characterization will also be compared to an ANSYS finite element model to further substantiate the results.

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Stennis Space Center SSC3-06-09-AN	Spring	Propulsion	Electrical, Electronic, Computer Engineering, Mechanical Engineering, Mechanics	HARDWRE-IN-THE-LOOP PROPULSION TEST SYSTEMS ANALYTIC MODELING: The goal of this project is to develop and validate the technology and processes for pre-test validation of facility readiness relative to hardware response, planned test sequence execution and system detection and response to off-nominal performance situations. SSC analytic models of test facility propellant systems will be integrated with test facility hardware control systems and hardware to provide test like environments that enable test facility operational checkout and readiness verification. This project requires a combination of ME and EE disciplines and includes both systems development with regard to system architecture development and integration as well as thermo/fluid systems modeling and analysis, focusing on faster than real-time execution that enables real time assessment of test operations.
Stennis Space Center SSC3-07-09-AN	Spring, Fall	Propulsion	Aerospace, Aeronautical, Astronautical Engineering, Mechanical Engineering, Mechanics	ENGINE TEST ALTITUDE SIMULATION TEST STAND DEVELOPMENT: SSC has initiated construction of an engine test altitude test stand to support NASA's Ares 1 and Ares V upperstage, J-2X engine development. A sundry of unique technology and engineering design and analysis investigations/trades are needed. 1) Design investigations of pressure-fed chemical steam generator system (4800 lb/sec,500 psi steam ejector system), including structural loads analysis, temporal transient performance investigations, system robustness/margin requirement definition & assessment, propellant supply sizing validation, etc..
Stennis Space Center SSC3-08-09-AN	Spring, Fall	Propulsion	Aerospace, Aeronautical, Astronautical Engineering, Mechanical Engineering, Mechanics	ENGINE TEST ALTITUDE SIMULATION TEST STAND DEVELOPMENT: SSC has initiated construction of an engine test altitude test stand to support NASA's Ares 1 and Ares V upperstage, J-2X engine development. A sundry of unique technology and engineering design and analysis investigations/trades are needed. 2) Analytic model development and related investigations of altitude simulation diffuser performance

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Stennis Space Center SSC3-09-09-AN	Spring, Fall	Propulsion	Aerospace, Aeronautical, Astronautical Engineering, Mechanical Engineering, Mechanics	ENGINE TEST ALTITUDE SIMULATION TEST STAND DEVELOPMENT: SSC has initiated construction of an engine test altitude test stand to support NASA's Ares 1 and Ares V upperstage, J-2X engine development. A sundry of unique technology and engineering design and analysis investigations/trades are needed. 3) A sundry of fluid flow and heat transfer technical issues